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ABSTRACT

The purpose of this study was to assess the effectiveness of a series of programmed workbooks for teaching basic handwriting skills to migrant children. Some 24 second-, fourth-, and sixth-grade classes in 4 counties of south and central Florida participated in the study, and control and experimental groups were set up for each grade level. Because of strict time limitations, only the first 4 lessons in the workbook were evaluated in the study. Evaluation consisted of (1) a set of open-ended questions concerning teachers' and students' opinions of the workbooks and (2) 3 sets of student tests covering the workbook materials. Analysis of the student tests revealed that the experimental group had significantly fewer errors than the control group only at the second-grade level. The teachers' opinions of the programmed workbooks were generally very favorable. (TL)

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The Effectiveness of a Programmed Method of Instruction for Teaching Handwriting Skills to Migrant Children

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INTRODUCTION

As part of a larger research effort aimed at discovering efficient means of providing a continuous educational experience for the highly mobile migrant child, the study reported in this paper was conducted to assess the effectiveness of a recently developed series of programmed workbooks for teaching basic handwriting skills for migrant children. The workbooks[3], developed under the direction of Skinner and Krakower, were constructed according to principles of immediate reinforcement. When using one of the workbooks the child is provided with a special pen containing a harmless ink which turns either grey or yellow upon contact with the chemically treated pages of the workbook. These pages contain invisable boundaries whithin which the child's writing must be contained in order for it to be correct. If, while writing, the child keeps within these boundaries the ink from his special pen turns grey. When he strays outside these boundaries, however, the ink turns yellow. In this way the child is made immediately aware of the quality of his handwriting.

The series of workbooks have been designed for grades 1-6 and cover a range of topics from the correct formation of lower case letters in the first workbook to practical uses of manuscript and cursive writing in the sixth workbook. Within each workbook, successive lessons become increasingly more difficult. The programmed workbooks are, for the most part, intented to be self instructional-- allowing the student to work on his own with only occasional direction from his teacher. It was thought, then, that these materials might fit well into the educational program for migrant children.

This study was conducted to test the effectiveness of the programmed workbooks on a sample of students from schools containing high proportions of migrant children. Since the study was initiated during the final weeks of the school year only two weeks were used to collect data. It was felt, however, that enough information could be obtained from observing the students' performance on the first four lessons of a workbook, to allow at least tentative conclusions regarding the suitability of this method of instruction for migrant children.

METHOD

Sample

A sample of 24 classrooms was selected from four counties in south and central Florida: Seminole, Hardee, Okeechobee, and St. Lucie. One elementary school from each county was selected according to the criterion that it contain a large proportion of migrant children. Two second-grade classrooms, two fourth-grade classrooms, and two sixth-grade classrooms were designated by the principal of each school to participate in the study. The enrollments of the classrooms numbered about 30 pupils.

Procedure

Representatives of the Migrant Education Project met personally with the two teachers from the same grade level at each school at the same time. At this point a coin was flipped to decide which of the two teachers would serve in the experimental group. This teacher was then given a sufficient supply of the programmed workbooks appropriate for the grade level that she taught along with a set of experimental materials. The second teacher was given a set of control materials but no programmed workbooks.

Experimental materials. The experimental materials consisted of a detailed set of instructions, a set of three test pages, and an evaluation form. The three test pages were duplicates of an early page in each of lessons 2-4 of the appropriate workbook For purposes of the study, the teachers in the experimental group were told to keep their students working together, as a unit, through the first four lessons at the rate of one lesson every two days. At the end of lesson two, three, and four the teachers were told to administer the appropriate test page. Each of these test pages, along with its corresponding original were returned to the experimenter after the children had finished lesson four.

The evaluation form consisted of several open-ended questions concerning the teachers' and students' opinions about the programmed materials.

The teachers in the experimental group were asked to answer these questions carefully and to return the evaluation from along with the other materials following lesson four.

Control materials. The control materials consisted of a set of instructions and a double set of test pages identical to those given in the experimental materials. The teachers in the control group were instructed to begin the program by administering the first test page. Two days later, they were told to administer, first, the second copy of the first test page, and then, the first copy of the second test page. This procedure was continued until the students had received both copies of each of the three test pages.

Although the teachers in the control group were not given an evaluation form they were told that any comments they wished to refer to the Migrant Education Project would be appreciated.

RESULTS and DISCUSSION[4]

Each test page (and corresponding original) was scored in terms of the number of errors made out of the total possible number of errors per given page. This score was then expressed as a proportion of incorrect responses and averaged over all students in each classroom yielding a mean error rate for each classroom. This rate (for the test pages in the experimental group and the second copies of a test pages in the control group) served as the dependent variable in the study. The error rates for the first and second adminstration of each of the three test page selections, for each group, are given in Table 1.

The error rates for the second administration of each test page were analyzed as a split-plot design with one within variable (test page --P) and two between variables (grade level--GL: and treatments--T) with a covariance adjustment for the first administration of each P. Since the programmed workbooks were completely confounded with GL, only the nested effects of P and T within each grade level were of interest. The appropriate analysis of variance summary is given in Table 2.

As can readily seen from the summary table, only the effects within the second grade were significant. Thus, at the second grade, receiving the

workbooks effectively decreased handwriting errors ($F' = 12.55$, $df = 1/17$, $p < .001$). Furthermore there was a significant difference among the pages selected for scoring in this study ($F' = 7.94$, $df = 2/35$, $p < .001$). The test page x experimental condition interaction was also signification ($F' - 4.90$, $df = 2/35$, $p < .01$).

The fact that performance differed across test pages, within the second grade might have been expected since different lessons in the workbook emphasize different types of handwriting skills. The interaction simply points out that on some of the pages, the experimental children were performing no better than their control group counterparts. In fact, a close examination of the data illustrates that the second grade children who received the workbooks profited the most from the second lesson (i.e. the first experimental lesson). Thereafter, their advantage can be seen to decline as they progress through the workbooks. A partial explanation of this phenomenon can be found in the teachers' evaluation form. Many of the teachers in the experimental groups stated that they felt they should have been given more time to work through each lesson.

The fact that the higher grades did not tend to benefit from the programmed materials is also not very surprising --- especially when one notes that the series of workbooks were designed to be used sequentially from the first to the sixth grade. The later workbooks in the series require subordinate skills which are assumed to have already been learned from the earlier workbooks. Thus it is possible that the failure to benefit from the materials at the higher grade levels reflected the loss of any advantage due to cummulative effects that might have occurred from continuous use of the programmed workbooks from the first grade. This argument, along with the fact that considerable improvement occurred at second grade implies that the programmed method of teaching handwriting to children is potentially suitable for the population of interest. This conclusion was supported by the teachers' evaluation of the program.

The results of the evaluation form filled out by the teachers of the experimental classrooms, were generally quite favorable toward the programmed workbooks. The majority of the teachers agreed that the workbooks were easy to work with and that the children enjoyed using them, were able to understand the instructions, and usually were able to work through the lessons on their

own. In many cases, however, the teachers stated that they would have preferred more time for each lesson. It will be recalled that the plan of this investigation called for a new lesson every two days. It is quite possible that some of the lessons would have been more efficiently handled if more time had been allowed. In fact, this would be consistent with the objectives of the programmed series itself which was designed to allow the individual student to proceed through each lesson at his own rate.

All twelve teachers stated that they had noticed improvement in their students handwriting skills and that in their opinion this improvement was a result of working with the programmed texts. Improvement was observed to take place in everything from spacing letters to the degree of conscientiousness the children showed in their writing. Many teachers remarked that the students became more aware of the mistakes they had been making in handwriting. Once again, however, the teachers expressed their opinion that the workbooks should have been used for a longer period of time. Most thought that more improvement would have been observed had this been the case.

When asked whether they thought the programmed handwriting series should be included as a standard part of the curriculum, eight of the teachers gave an unconditional "yes". Of those giving negative opinions, one sixth grade teacher argued that by the sixth grade level handwriting skills had already been formed. Thus it was useless and perhaps unwise, to attempt to teach the children a new handwriting style. It is possible however, that this teacher's opinion would have been different had the students been exposed to the earlier texts in the series at lower grade levels. Of the remaining teachers giving a negative response to this question. one stated flatly that she did not find the writing style demanded by the programmed workbooks asthetically pleasing!

TABLE 1

Mean Error Rates for the First (Rre) and Second (Post) Administration of Each Test Page

		First Page Selection		Second Page Selection		Third Page Selection	
		Pre	Post	Pre	Post	Pre	Post
Grade 2	Experimental	.683	.387	.782	.801	.231	.223
		.812	.411	.861	.641	.276	.218
		.791	.357	.879	.772	.300	.268
		.853	.448	.875	.790	.327	.241
	Control	.504	.503	.800	.743	.304	.275
		.661	.544	.768	.755	.288	.310
		.449	.443	.833	.809	.271	.232
		.620	.607	.856	.847	.296	.291
Grade 4	Experimental	.711	.764	.413	.407	.598	.667
		.601	.496	.396	.398	.614	.632
		.362	.304	.251	.265	.416	.335
		.518	.524	.406	.229	.547	.619
	Control	.404	.373	.192	.230	.522	.499
		.393	.238	.258	.323	.594	.630
		.319	.317	.325	.399	.632	.562
		.514	.405	.450	.536	.560	.569
Grade 6	Experimental	.883	.899	.633	.735	.650	.209
		.499	.453	.431	.375	.151	.087
		.598	.654	.760	.715	.213	.129
		.228	.386	.266	.171	.152	.327
	Control	.484	.469	.796	.836	.454	.439
		.386	.354	.541	.495	.170	.108
		.814	.814	.906	.840	.178	.129
		.568	.749	.722	.813	.051	.075

TABLE 2

Analysis of Variance and Covariance
Summary for the Nested Split-Plot Design

SOURCE	UNADJUSTED df	SS	ADJUSTED df'	SS'	F'
GL	2	.030	2	.041	Not Tested
T w. GL_2	1	.027	1	.100	12.55**
T w. GL_4	1	.013	1	.000	N.S.
T w. GL_6	1	.040	1	.009	N.S.
Clsrms w. T x GL	18	.571	17	.111	
P w. GL_2	2	1.064	2	.124	7.94**
P w. GL_4	2	.190	2	.018	N.S.
P w. GI_6	2	.952	2	.046	N.S.
T x P w. GL_2	2	.006	2	.077	4.90*
T x P w. GL_4	2	.063	2	.030	N.S.
T x P w. GL_6	2	.082	2	.008	N.S.
P x Clsrms w. T x GL	36	.488	35	.274	

GL_2 = Grade 2
GL_4 = Grade 4
GL_6 = Grade 6
T = Exp. and Control Treatments
P = Test Page

*p .01
**p .001

FOOTNOTES

1. This paper was presented at the national meeting of the American Educational Research Association in Minneapolis on March 3, 1970.

2. The study reported herein was supported by a contract between the Florida State Department of Education and Board of Regents of the State University System of Florida.

3. This series of workbooks, Handwriting with Write and See, are published by Lyons and Carnahan, Inc., Chicago.

4. An analysis of the data following arcsine transformation of the error rates was also performed. Since the results were similar, only the analysis of the raw error rates is reported.